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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/066,920	02/04/2002	Takenori Sekijima	P/1071-1539	4354

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EXAMINER	
SONG, MATTHEW J	

ART UNIT	PAPER NUMBER
1765	//

DATE MAILED: 10/09/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/066,920	Applicant(s) SEKIJIMA ET AL.	
	Examiner Matthew J Song	Art Unit 1765	

-- The MAILING DATE of this communication appears on the cover sheet with th correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 July 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4 and 8-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4 and 8-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

2. Claims 1-3, 8-9, and 11-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sekijima et al (US 6,039,802) in view of Wysocki et al (US 5,069,743) or Kou (US 5,114,528).

Sekijima et al discloses a single crystal growth method, which allows single crystal to be grown stable while controlling its growth orientation. The method comprises the steps of holding a polycrystalline rod and seed crystal within a heating furnace; heating the polycrystalline rod to form a melt zone and growing a single crystal by moving a melt zone (Abstract and Figs 1-5). Sekijima et al also discloses the polycrystalline rod may be a thin crystal having a fibrous shape of less than 3 mm in diameter (col 4, ln 15-25). Sekijima et al also discloses the single crystal

growth method is self solvent floating zone and the polycrystal is YIG or an oxide superconductor such as YBCO (col 3, ln 25-67). Sekijima et al also discloses the density of the raw material may be increased and a good quality crystal can be grown with a high yield (col 2, ln 50-67).

Sekijima et al does not disclose manufacturing a single crystal without using any seed crystal.

In a method of controlling orientation of float zone grown crystals, note entire reference, Wysocki et al teaches a process, which obviates the need for any seed crystal (Abstract). Wysocki et al teaches preparing a rod **12** of a non-congruently melting composition is placed in a float zone chamber **20.** Wysocki et al teaches growing single crystal ingots from polycrystalline rods in a float zone apparatus, in which the crystallographic orientation may be altered by controlling the temperature of the melt zone and the translation rate of the polycrystalline rod (col 5, ln 15-27). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Sekijima et al with Wysocki et al's method of float zone growth to eliminate the need for a seed crystal, which reduces cost.

Kou teaches a method of forming a monocrystalline body from a polycrystalline feed rod by floating zone refining such that a molten zone is caused to traverse the polycrystalline rod to convert the polycrystalline rod to a monocrystalline body (claim 1). Kou also teaches the formation of $NaNO_3$ crystal rods using polycrystalline $NaNO_3$ feed rods 6 mm in diameter prepared by casting and a shaper provided with holes for melt flow of 1 and 2 mm in diameter, this reads on applicant's fiber shaped crystal, which is 3 mm or smaller in diameter. Kou also teaches the density of feed rod is expected to significantly different from that of the crystal (col

9, ln 10-68). Kou also teaches no single crystal seeds were required to grow single crystals of $NaNO_3$ (col 10, ln 19-22). Kou also discloses a heater is formed of a RF induction coil (col 7, lm 30-40). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Sekijima et al with Kou's method of float zone growth to eliminate the need for a seed crystal, which reduces cost.

The combination of Sekijima et al and Wysocki et al or the combination of Sekijima et al and Kou is silent to the crystal grows in the direction normal to the densest surface. However, this is inherent to combination of Sekijima et al and Wysocki et al or the combination of Sekijima et al and Kou because combination of Sekijima et al and Wysocki et al or the combination of Sekijima et al and Kou teach a similar method of float zone growth. Also the molten zone is inherently less dense than a growing single crystal therefore the growth inherently occurs in a direction normal the growing single crystal, the densest surface.

Referring to claim 8, the combination of Sekijima et al and Wysocki et al or the combination of Sekijima et al and Kou teach YIG ('802 col 1, ln 10-20), this reads on applicant's $(Y,R)_3Fe_5O_{12}$.

3. Claims 4 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sekijima et al (US 6,039,802) in view of Wysocki et al (US 5,069,743) or Kou (US 5,114,528) as applied to claims 1-3, 8-9 and 11-17 above, and further in view of Cordova-Plaza et al (US 5,082,349) or Kobayashi et al (US 4,323,418).

The combination of Sekijima et al and Wysocki et al or the combination of Sekijima et al and Kou discloses all of the limitations of claim 4, as discussed previously, except that step (b) is performed using the Laser Heated Pedestal Growth Method.

In a method of manufacturing single crystals, Cordova-Plaza et al teaches single crystal fibers have been manufactured using the laser heated pedestal growth method, a variant of the float zone process. And in such a method, the upper end of a source rod of crystal material is heated with a focused laser beam (col 2, ln 1-67). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Sekijima et al and Wysocki et al or the combination of Sekijima et al and Kou with Cordova-Plaza et al's laser heated pedestal growth method utilizing a laser beam to form a molten zone because heating with a laser beam to form a molten zone is well known variant to the float zone method of crystal growth.

In a method of growing single crystals, note entire reference, Kobayashi et al teaches a floating zone technique, where a feed rod is heated into a molten zone by radio frequency heating or laser heating, this reads on applicant's laser heated pedestal growth method, and the molten zone is transferred, thereby turning the feed rod into a single crystal (col 1, ln 10-55). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Sekijima et al and Wysocki et al or the combination of Sekijima et al and Kou's heating with Kobayashi's laser heating because substitution of known equivalents for the same purpose is held to be obvious (MPEP 2144.06).

4. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wysocki et al (US 5,069,743) or Kou (US 5,114,528).

In a method of controlling orientation of float zone grown crystals, note entire reference, Wysocki et al teaches a process, which obviates the need for any seed crystal (Abstract). Wysocki et al teaches preparing a rod **12** of a non-congruently melting composition is placed in a float zone chamber **20.** Wysocki et al teaches growing single crystal ingots from polycrystalline rods in a float zone apparatus, in which the crystallographic orientation may be altered by controlling the temperature of the melt zone and the translation rate of the polycrystalline rod (col 5, ln 15-27).

Kou teaches a method of forming a monocrystalline body from a polycrystalline feed rod by floating zone refining such that a molten zone is caused to traverse the polycrystalline rod to convert the polycrystalline rod to a monocrystalline body (claim 1). Kou also teaches the formation of $NaNO_3$ crystal rods using polycrystalline $NaNO_3$ feed rods 6 mm in diameter prepared by casting and a shaper provided with holes for melt flow of 1 and 2 mm in diameter, this reads on applicant's fiber shaped crystal, which is 3 mm or smaller in diameter. Kou also teaches the density of feed rod is expected to significantly different from that of the crystal (col 9, ln 10-68). Kou also teaches no single crystal seeds were required to grow single crystals of $NaNO_3$ (col 10, ln 19-22). Kou also discloses a heater is formed of a RF induction coil (col 7, lm 30-40).

Wysocki et al or Kou is silent to the shape of the single crystal is a fiber shaped single crystal and is 3 mm or smaller in diameter. Changes in shape are held to be obvious (MPEP

2144.03). Furthermore, a fiber shaped single crystal, which is 3 mm or smaller in diameter is well known in the art, note Sekijima et al (US 6,039,802) above.

Wysocki et al or Kou is silent to the crystal grows in the direction normal to the densest surface. However, this is inherent to Wysocki et al or Kou because Wysocki et al or Kou teaches a similar method of float zone growth. Also the molten zone is inherently less dense than a growing single crystal therefore the growth inherently occurs in a direction normal the growing single crystal, the densest surface.

Response to Arguments

5. Applicant's arguments with respect to claims 1-4 and 8-17 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Yoshida et al (US 4,853,066) teaches if a single crystal can be produced without using any seed crystal, then cost of the single crystal will be reduced highly effectively (col 2, ln 15-25).

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J Song whose telephone number is 703-305-4953. The examiner can normally be reached on M-F 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 703-305-2667. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Matthew J Song
Examiner
Art Unit 1765

MJS

NADINE G. NORTON
PRIMARY EXAMINER